

THE HONG KONG INSTITUTION OF ENGINEERS
SCHEME “A” GRADUATE TRAINING
CONSOLIDATED MODEL TRAINING GUIDE
STRUCTURAL ENGINEERING

Location where Training will be done	Training Outcomes	Previous Reference	HKIE Competence Ref.	Length of Time (weeks)
	1. Introduction			1
	1.1 Information about the Company			
<i>Location 1</i>	<i>Description 1</i>			
	1.1.1 Own Organisation <ul style="list-style-type: none"> a) Discuss the size, history and internal culture of the trainee’s own organisation. b) Discuss an overview of the relationship between the trainee’s own organisation, government departments and other organisations. c) Discuss the structure and functions of different units within the trainee’s own organisation. d) Demonstrate the awareness to follow operational procedures and practices as required by the trainee’s own organisation. e) Discuss the objectives, requirements and processes that support the quality assurance system within the trainee’s own organisation. f) Apply the quality assurance system according to the policy of the trainee’s own organisation. 	CCO 1.10 CCO 1.10 CCO 1.10 CCO 1.10 CCO 1.10	11 11 11 11	
	1.1.2 Training Programme, Prospects and Career Development <ul style="list-style-type: none"> a) Discuss an overview of the internal communication systems, training system and career development pathway within the trainee’s own organisation. 	CCO 1.10	11	

THE HONG KONG INSTITUTION OF ENGINEERS
SCHEME “A” GRADUATE TRAINING
CONSOLIDATED MODEL TRAINING GUIDE
STRUCTURAL ENGINEERING

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	<p>b) Demonstrate a commitment to extend and develop up-to-date technical knowledge through reading relevant engineering publications, participating in seminars or conferences, and information searching.</p> <p>c) Demonstrate a commitment to extend and develop up-to-date knowledge of local, regional and international current affairs through reading relevant engineering publications, participating in seminars or conferences, and information searching.</p> <p>d) Demonstrate a commitment to participate in the local organisations or community services for general personal development.</p>	<p><i>CCO 1.2</i></p> <p><i>CCO 1.3</i></p> <p><i>CCO 1.3</i></p>	<p>11</p> <p>11</p> <p>11</p>	
	1.2 Information about the HKIE			
Location 2	Description 2			
	<p>a) Discuss an overview of the HKIE organisation as well as its history and role in society.</p> <p>b) Demonstrate a commitment to participate in relevant activities organised by the HKIE.</p>	<p><i>CCO 1.1</i></p> <p><i>CCO 1.1</i></p>	<p>11</p> <p>11</p>	
	2. Engineer as a Profession			Continuous
	2.1 Professionalism			
Location 3	Description 3			
	<p>a) Discuss the social and ethical responsibilities of engineers in society.</p>	<p><i>CCO 1.2</i></p>	<p>8</p>	

THE HONG KONG INSTITUTION OF ENGINEERS
SCHEME “A” GRADUATE TRAINING
CONSOLIDATED MODEL TRAINING GUIDE
STRUCTURAL ENGINEERING

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	<p>b) Explain the rules and standard requirements of conducting engineering activities to the HKIE, employers, clients, general public and colleagues in accordance with the HKIE Rules of Conduct.</p> <p>c) Explain the ethical standards and responsibilities of professional engineers as required by the HKIE.</p> <p>d) Demonstrate the awareness to follow the codes of practice of professional engineers.</p> <p>e) Demonstrate the awareness to uphold the dignity, standing and reputation of the engineering profession.</p> <p>f) Demonstrate the awareness to protect the interests of the community including the environment, welfare, health and safety in conducting engineering activities.</p> <p>g) Demonstrate the awareness on the statutory, contractual and professional duties of a structural engineer as required by the HKIE.</p> <p>h) Demonstrate the awareness on the role of structural engineers that is to develop the skeletal framework and the foundation and other soil/structural interfacing works for bridges, buildings and other structural forms, which are to withstand the natural forces due to gravitational, wind, soil, water, earthquake and/or other environmental effects.</p>	<p><i>CCO 1.2</i></p> <p><i>CCO 1.2</i></p> <p><i>CCO 1.2</i></p> <p><i>CCO 1.2</i></p> <p><i>CCO 1.2</i></p> <p><i>CO6.1</i></p> <p><i>CO 1.1</i></p>	<p>8</p> <p>8</p> <p>8</p> <p>8</p> <p>8</p> <p>8</p> <p>1</p>	

THE HONG KONG INSTITUTION OF ENGINEERS
SCHEME “A” GRADUATE TRAINING
CONSOLIDATED MODEL TRAINING GUIDE
STRUCTURAL ENGINEERING

Location where Training will be done	Training Outcomes	Previous Reference	HKIE Competence Ref.	Length of Time (weeks)
	i) Demonstrate the awareness on the scope of client services of structural engineers that is to deliver structures which meet the client requirements. (This may be done by structural engineers on their own or in collaboration with other professionals such as architects, building services engineers, quantity surveyors etc.)	<i>CO 1.2</i>	6	
	2.2 Occupational Safety and Health			
Location 4	Description 4			
	a) Demonstrate an understanding of the statutory health and safety requirements.	<i>CCO 1.5</i>	9	
	b) Demonstrate an understanding of the responsibilities of professional engineers for the health and safety of the employers, employees and general public when engaging in engineering activities.	<i>CCO 1.5</i>	9	
	c) Apply the safety management system in accordance with the industry standards and regulatory requirements.	<i>CCO 1.5</i>	7	
	2.3 Environment and Sustainability			
Location 5	Description 5			
	a) Demonstrate an understanding of the relevant statutory environmental requirements related to the trainee’s discipline.	<i>CCO 1.6</i>	9	
	b) Evaluate the inter-relationship of technology with the environment in the work place.	<i>CCO 1.6</i>	9	
	c) Demonstrate the awareness of the impact of technology on the environment in society.	<i>CCO 1.6</i>	9	

THE HONG KONG INSTITUTION OF ENGINEERS
SCHEME “A” GRADUATE TRAINING
CONSOLIDATED MODEL TRAINING GUIDE
STRUCTURAL ENGINEERING

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	3. Basic and Supplementary Training			13
	3.1 Familiarisation with structural engineering solutions			
Location 6	Description 6			
	a) Comprehend the procedures in the planning, design, tendering, construction and maintenance stages of structural engineering projects.	<i>CO 1.3</i>	6	
	b) Examine various aspects in defining a structural engineering problem including the purpose and functional requirements of the structure to be developed, the design parameters and constraints, the cost and time implications and other statutory and safety requirements.	<i>CO 2.1</i>	3	
	c) Comprehend the application and limitations of international standards.	<i>CO 2.3</i>	1	
	d) Comprehend the Hong Kong codes of practice, Building Regulations, Practice Notes etc. taking into account their applications and limitations.	<i>CO 2.3</i>	2	
	e) Distinguish various types of structural materials, manufacture / construction methods, cost parameters and the associated time implications.	<i>CO 2.4</i>	2	
	f) Develop manual and/or computer analysis for load and stress distribution within a structural system.	<i>CO 3.5</i>	3	
	4. Engineering Design and Practice			78
	4.1 Research and interpret available data or information			
Location 7	Description 7			
	a) Distinguish different methods to obtain design information relevant to the site, including site investigation, field tests and laboratory tests for soil, wind, earthquake and/or other environmental parameters.	<i>CO 2.2</i>	3	

THE HONG KONG INSTITUTION OF ENGINEERS
SCHEME “A” GRADUATE TRAINING
CONSOLIDATED MODEL TRAINING GUIDE
STRUCTURAL ENGINEERING

Location where Training will be done	Training Outcomes	Previous Reference	HKIE Competence Ref.	Length of Time (weeks)
	<ul style="list-style-type: none"> b) Apply soil parameters as established from site investigation and laboratory tests on foundation design and soil structural interactions. c) Distinguish various types of structural materials, manufacture / construction methods, cost parameters and the associated time implications. d) Evaluate alternative solutions from technical and financial perspectives. 	<p><i>CO 3.3</i></p> <p><i>CO2.4</i></p> <p><i>CO2.5</i></p>	<p>2</p> <p>2</p> <p>12</p>	
	4.2 Liaise with client and develop a design in collaboration with other disciplines			
Location 8	Description 8			
	<ul style="list-style-type: none"> a) Produce structural design requirements as set out in the client’s brief. b) Assess structural design constraints as set out in the client’s brief. c) Examine the design input from other disciplines. d) Liaise with other disciplines to produce an optimum solution for the client. 	<p><i>CO 3.1</i></p> <p><i>CO 3.1</i></p> <p><i>CO 3.2</i></p> <p><i>CO 3.2</i></p>	<p>4</p> <p>3</p> <p>5</p> <p>6</p>	
	4.3 Prepare and check structural calculations for foundations and superstructures in structural steel, reinforced concrete or other structural materials			
Location 9	Description 9			
	<ul style="list-style-type: none"> a) Produce clear and comprehensive calculations and specifications of structural solutions. b) Apply loading parameters due to gravitational, wind, earthquake and/or other environmental effects for superstructure and foundation designs. c) Apply design codes and standards to design structural members and foundation according to the types of structural materials used and the stresses derived from the analysis. 	<p><i>CO 2.6</i></p> <p><i>CO 3.4</i></p> <p><i>CO 3.6</i></p>	<p>10</p> <p>2</p> <p>2</p>	

THE HONG KONG INSTITUTION OF ENGINEERS
SCHEME “A” GRADUATE TRAINING
CONSOLIDATED MODEL TRAINING GUIDE
STRUCTURAL ENGINEERING

Location where Training will be done	Training Outcomes	Previous Reference	HKIE Competence Ref.	Length of Time (weeks)
	d) Carry out site formation and slope stability designs associated with buildings, bridges and/or other structural forms.	<i>CO 3.7</i>	2	
	4.4 Prepare and check general arrangement and detail drawings and specifications for contract documents			
Location 10	Description 10			
	a) Produce clear and comprehensive drawings of structural solutions.	<i>CO 2.7</i>	10	
	b) Produce design output in the form of calculations, drawings and specifications.	<i>CO 3.8</i>	10	
	5. Site Experience			26
	5.1 Planning and programming of construction works			
Location 11	Description 11			
	a) Develop project planning and programming.	<i>CO 4.11</i>	4	
	b) Examine project progress against schedule and make necessary amendment.	<i>CO 4.11</i>	5	
	c) Produce project progress reports.	<i>CO 4.11</i>	10	
	5.2 Methods of construction including site investigation and site formation works			
Location 12	Description 12			
	a) Examine various in-situ tests and collection of soil and rock samples for site investigation.	<i>CO 4.6</i>	5	
	b) Examine the types of site formation works in association with different types of structures.	<i>CO 4.8</i>	5	
	c) Distinguish different methods of construction for a particular type of structure and their advantages and limitations.	<i>CO 4.9</i>	3	
	d) Comprehend the performance and cost of plants and equipment and their applications in site investigation, site formation, foundation and superstructure construction.	<i>CO 4.10</i>	6	

THE HONG KONG INSTITUTION OF ENGINEERS
SCHEME “A” GRADUATE TRAINING
CONSOLIDATED MODEL TRAINING GUIDE
STRUCTURAL ENGINEERING

Location where Training will be done	Training Outcomes	Previous Reference	HKIE Competence Ref.	Length of Time (weeks)
	5.3 Supervision of construction including checking of setting out, quality of materials and workmanship aspects			
Location 13	Description 13			
	a) Appraise engineering drawings for implementation of works.	<i>CO 4.5</i>	1	
	b) Produce critical coordinates and dimensions for setting out the construction.	<i>CO 4.7</i>	1	
	c) Apply measures to control the construction within tolerable limits.	<i>CO 4.7</i>	1	
	d) Comprehend the principles of quality assurance and control to meet relevant standards.	<i>CO 4.14</i>	6	
	e) Assess quality of materials and workmanship.	<i>CO 4.15</i>	12	
	5.4 Measurement of works, preparation of site records and reports			
Location 14	Description 14			
	a) Explain the procedures for the issue and/or receipt of work instructions and/or drawings and amendments.	<i>CO 4.3</i>	1	
	b) Produce accurate daily records of events and instructions.	<i>CO 4.4</i>	6	
	5.5 Monitoring of construction safety			
Location 15	Description 15			
	a) Assess safety risks at work.	<i>CO 4.13</i>	7	
	b) Develop safe working practice.	<i>CO 4.13</i>	4	
	6. Engineering Management			13
	6.1 Procurement and Tendering procedure			
Location 16	Description 16			
	a) Comprehend various types and methods of procurement for structural engineering works, including consultant services, material supplies, fabrication in factories and construction on sites.	<i>CO 5.1</i>	6	

THE HONG KONG INSTITUTION OF ENGINEERS
SCHEME “A” GRADUATE TRAINING
CONSOLIDATED MODEL TRAINING GUIDE
STRUCTURAL ENGINEERING

Location where Training will be done	Training Outcomes	Previous Reference	HKIE Competence Ref.	Length of Time (weeks)
	<ul style="list-style-type: none"> b) Assess procured products or services based on track records, job references, past performance, financial capabilities, tender prices and / or fee proposals. c) Carry out procedures from tender invitation to contract award and the subsequent post-contract management. d) Explain the procedures for selection of eligible tenderers, documentation, invitation and assessment of tenders. 	<p><i>CO 5.2</i></p> <p><i>CO 5.3</i></p> <p><i>CO 5.4</i></p>	<p>6</p> <p>6</p> <p>6</p>	
	6.2 Contract Administration			
Location 17	Description 17			
	<ul style="list-style-type: none"> a) Explain the duties and responsibilities of parties involved in a contract. b) Discuss various parts of a contract document including the conditions of contract, specifications, bills of quantities and drawings. c) Comprehend the process of contract management including the control of expenditure, progress monitoring and quality of works. d) Examine project work done for payment purposes. 	<p><i>CO 4.1</i></p> <p><i>CO 4.2</i></p> <p><i>CO 5.5</i></p> <p><i>CO 4.12</i></p>	<p>1</p> <p>1</p> <p>6</p> <p>6</p>	
	7. Consolidating Stage			25
	<p><i>This section covers training in any activities related to structural engineering. It should aim to develop skills and knowledge relating to personal qualities, communication, human resources management and business operational sense in addition to the technical, commercial and engineering knowledge acquired by the trainees during earlier parts of their training. Latest developments in the discipline should be included. All Training Outcomes, if not yet achieved in earlier parts of training, should be completed here.</i></p>			

THE HONG KONG INSTITUTION OF ENGINEERS
SCHEME “A” GRADUATE TRAINING
CONSOLIDATED MODEL TRAINING GUIDE
STRUCTURAL ENGINEERING

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	8. Other Common Core Outcomes for Continuous Development			Continuous
	8.1 Leadership and Management			
Location 18	Description 18			
	a) Discuss the various leadership qualities required of a leader including accountability, conflict management and resources management etc.	<i>CCO 1.9</i>	6	
	b) Explain the importance of accountability and responsibility required by a leader for making decisions on engineering activities.	<i>CCO 1.9</i>	6	
	c) Apply various management skills in engineering projects.	<i>CCO 1.9</i>	6	
	d) Distinguish the relationship between good leadership and good management skills.	<i>CCO 1.9</i>	6	
	e) Demonstrate an understanding of the importance of teamwork and partnering skills in engineering projects.	<i>CCO 1.9</i>	6	
	8.2 Development of Personal Qualities			
Location 19	Description 19			
	a) Identify appropriate innovative approach and/or tools for professional development.	<i>CCO 1.4</i>	11	
	b) Demonstrate interpersonal skills for professional development.	<i>CCO 1.4</i>	10	
	c) Demonstrate negotiating skills required for various engineering activities.	<i>CCO 1.4</i>	10	
	d) Demonstrate sound time management skills for professional development.	<i>CCO 1.4</i>	11	
	e) Demonstrate a commitment to continuous development and enhancement.	<i>CCO 1.4</i>	11	
	8.3 Communication			
Location 20	Description 20			
	a) Communicate ideas orally in an accurate and clear manner under various situations (including presentations and meetings).	<i>CCO 1.7</i>	10	
	b) Formulate an oral presentation of complicated data and information in an effective and persuasive manner.	<i>CCO 1.7</i>	10	

THE HONG KONG INSTITUTION OF ENGINEERS
SCHEME “A” GRADUATE TRAINING
CONSOLIDATED MODEL TRAINING GUIDE
STRUCTURAL ENGINEERING

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	c) Produce grammatically correct, clear and concise documents (including memos, letters, instructions, reports, resumes and technical papers) which meet the business objectives.	<i>CCO 1.7</i>	10	
	d) Evaluate the needs of the intended readers to design appropriate technical contents for communication.	<i>CCO 1.7</i>	10	
	8.4 Human Resources Management			
Location 21	Description 21			
	a) Demonstrate the awareness of the duties and employment criteria for different job positions in an engineering project.	<i>CCO 1.8</i>	6	
	b) Demonstrate an understanding of the relevant legal requirements and regulatory issues of labour employment and management.	<i>CCO 1.8</i>	6	
	c) Discuss the appropriate staff training and development programmes in the organization.	<i>CCO 1.8</i>	6	
	8.5 Business Operations			
Location 22	Description 22			
	(a) Recognise the importance of intellectual property to business operations.	<i>CCO 1.11</i>	11	
	(b) Describe the legal requirements in Hong Kong relevant to intellectual property rights.	<i>CCO 1.11</i>	11	
	(c) Identify appropriate tools and method to measure and improve the productivity of business operations.	<i>CCO 1.11</i>	11	
	(d) Identify appropriate information technology applications to manage business information and to facilitate business operations.	<i>CCO 1.11</i>	11	
	(e) Recognise the importance of research and development towards business operations.	<i>CCO 1.11</i>	11	
	(f) Demonstrate the awareness of financial considerations in operating business.	<i>CCO 1.11</i>	11	

THE HONG KONG INSTITUTION OF ENGINEERS
SCHEME “A” GRADUATE TRAINING
CONSOLIDATED MODEL TRAINING GUIDE
STRUCTURAL ENGINEERING

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	(g) Recognise the importance of business development in business operations.	<i>CCO</i> <i>1.11</i>	11	

N.B.

1. The training period must not be less than 156 weeks (36 months).
2. The programme set out is for guidance only but substantial departure should not be made. Employers should endeavour to provide training to their trainees in as many areas as possible as is appropriate to the sector of employment.
3. This guide should be read in conjunction with Section 3 of the M3 Routes to Membership.
4. During the training, each trainee is required to maintain a Graduate Training Log Book, Record of Continuing Professional Development and Record of Training Outcomes.